

Plume Diagnostics for Combustion Stability, Phase I

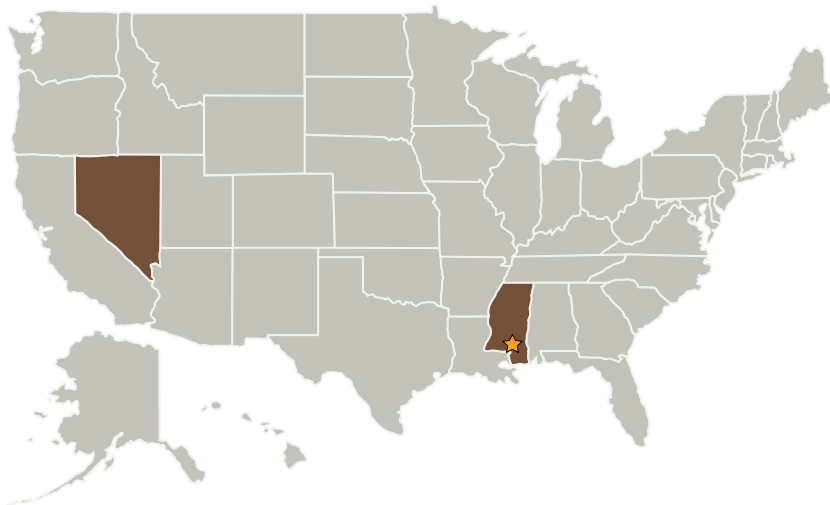
Completed Technology Project (2006 - 2007)



Project Introduction

Sierra Engineering and Purdue University propose to leverage combustion stability testing, already funded and planned for the second and third quarters of next year at Purdue, by developing a non-intrusive plume instrument capable of detecting combustion instability and testing it during combustor firings. Purdue has previously created the combustor and demonstrated unstable combustion operation. Sierra will apply its experience with plume signature prediction and plume signature tailoring to model the combustor response and estimate the high frequency variations in the combustion process that feeds the instabilities. Both Sierra and Purdue have expertise in combustion instability and the mechanisms that cause it. This expertise will be used to develop a methodology, based on plume observations, to estimate combustion burning response and, hence, predict combustion stability margin. During a Phase II STTR, more testing and higher fidelity instrumentation will mature the methodology for future application to NASA test facilities. Successful completion of this project will provide a non-intrusive tool for detecting and diagnosing combustion instability that is superior to current intrusive methods.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission
Directorate (STMD)

Lead Center / Facility:

Stennis Space Center (SSC)

Responsible Program:

Small Business Innovation
Research/Small Business Tech
Transfer

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| Organizations Performing Work | Role | Type | Location |
|-------------------------------|-------------------------|-------------|-----------------------------------|
| ★Stennis Space Center(SSC) | Lead Organization | NASA Center | Stennis Space Center, Mississippi |
| Sierra Engineering, Inc. | Supporting Organization | Industry | Carson City, Nevada |

Primary U.S. Work Locations

| | |
|-------------|--------|
| Mississippi | Nevada |
|-------------|--------|

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
 - └ TX14.1 Cryogenic Systems
 - └ TX14.1.5 Cryogenic Analysis, Safety & Properties